DOCUMENT RESUME

ED 102 763 EC 071 374

TITLE	Planning Facilities for Physically Handicapped Children. Fifth Annual Conference.
INSTITUTION	Tennessee Univ., Knoxville. School Planning Lab.
PUB DATE	[74]
NOTE	46p.; Photos have been deleted because of poor reproducibility
EDRS PRICE	MF-$0.76 HC-$1.95 PLUS POSTAGE
DESCRIPTORS	*Architectural Barriers; Aurally Handicapped; *Building Design; *Conference Reports; Educational Facilities; Exceptional Child Services; *Guidelines; *Physically Handicapped; Visually Handicapped; Vocational Education
IDENTIFIERS	Tennessee

ABSTRACT

The conference report on planning usable, accessible educational facilities for physically handicapped (orthopedically, visually, and aurally impaired) children features guidelines for eliminating indoor and outdoor architectural barriers. In developing and evaluating the guidelines, the Tennessee School Planning Laboratory analyzed plans of other states for identifying handicapped students and for providing them with usable facilities, revieved pertinent literature, and sought advice from experts on the special needs of the physically impaired. The ethical and legal rationale for including disabled students in regular schools is discussed by conference speakers, and general suggestions are offered in connection with vocational education and with options for conversion of available buildings to maximize accessibility. Presented are guidelines for the construction of new facilities in regard to exterior site preparation, such as the provision of easily accessible building entrances and elevators, nonslip ramp surfaces equipped with handrails, walks and curbs that facilitate unhindered movement, and special parking facilities located near buildings. Considered among guidelines for building interiors are recommendations concerning corridor width, stairway design, elevators, drinking fountains and restrooms, and special areas such as cafeterias, gymnasiums, swimming pools, and libraries. Photographs and drawings used to illustrate the text have been deleted because of poor reproducibility. (LH)

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PLANNING FACILITIES FOR PHYSICALLY HANDICAPPED CHILDREN

FIFTH ANNUAL CONFERENCE

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- **April 24, 1974 at Knoxville, Tennessee**
- **April 25, 1974 at Jackson, Tennessee**
- **April 26, 1974 at Nashville, Tennessee**

The School Planning Laboratory
College of Education
University of Tennessee

EC 071 374

2

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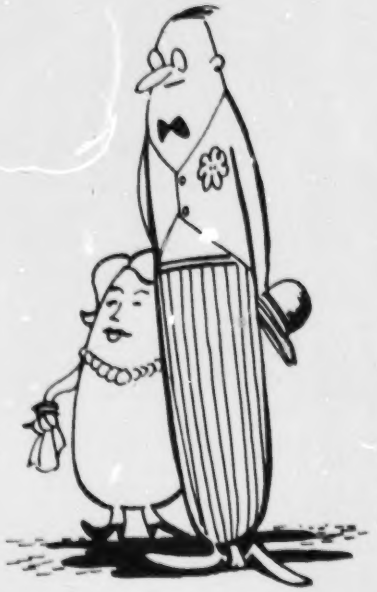

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CONTENTS

Foreword 6

The Setting 8

Eliminating Architectural Barriers
In Educational Facilities 11

Options For Planning Comprehensive
Services for the Handicapped 13

Vocational Programs/Facilities for
The Handicapped 15

Tennessee Guidelines for Making
Educational Facilities Usable
by the Handicapped 19

FOREWORD

The legislature of the State of Tennessee recently enacted legislation mandating that all educational facilities constructed, remodeled or renovated henceforth should have provisions for accommodating the physically impaired. A reason for this can be attributed to the position of the State Department of Education that no institutions in this State should provide services for the physically handicapped, except in those cases in which the student or child cannot function to the full extent of his ability in a regular classroom, or where there are extenuating circumstances requiring that he not be placed in a re[illegible]e. normal, typical) classroom.

In response to this legislation, the Tennessee State Department of Education was given the responsibility for establishing criteria that would enable handicapped students to attend schools in his/her district. The Tennessee State Department of Education subsequently requested the School Planning Laboratory, College of Education, University of Tennessee, to assist in developing guidelines for making education facilities accessible to, and usable by, the physically impaired. An extensive and comprehensive study was initiated by the Laboratory in response to this request. Several st[illegible]s were identified as necessary for these guidelines to reflect current thinking as well as be comprehensive in nature.

Information was requested from the Chief State School Officer in each State regarding that State's procedure for identifying handicapped students and guidelines for making education facilities accessible to, and usable by, these students. Each response was tabulated and compared to reveal both similarities and disparities between and among each of the States.

Simultaneously, assistance from numerous national organizations was requested to further identify the handicapped and determine the type of facility to adequately accommodate these students.

As a complement to this phase of the study, an extensive review of literature was conducted utilizing the resources of the libraries at the University of Tennessee and information available from the Educational Resources Information Center located at the Tennessee Research Coordinating Unit.

From these two phases of the study (i.e., the analysis of the state plans and the review of literature), preliminary guidelines for making facilities accessible to the handicapped in the State of Tennessee were developed.

The developing of the preliminary guidelines was not deemed to be sufficient, for obviously, the impact of them is to be tremendous. It was felt the guidelines should be reviewed by a panel of experts familiar with the elimination of architectural barriers and making facilities accessible to, and usable by, the physically impaired.

Two critiques, by the panel, were considered necessary. First, it was required to determine the adequacy of the preliminary guidelines and to ask for suggestions for improving them.

Upon receiving the initial critiques, the guidelines were revised to incorporate suggestions of panel members.

A second critique was conducted utilizing the panel of experts. In this mailing, they were asked to react to the revised guidelines. Thus, the panel members had an opportunity to review the revised guidelines and to determine their adequacy.

The guidelines for the State of Tennessee for making facilities accessible to and usable by the physically impaired, reflect the combined thinking of the most knowledgeable persons available. Use of these guidelines by school systems throughout the State will insure that all citizens may enjoy the benefits that have been denied to them because of the inaccessibility of many of the buildings of this State.

THE SETTING

Most persons use sidewalks, stairways, revolving doors, restrooms, public telephones, hallways and parking lots without much thought. Rather, they are accepted as part of their daily activity. For millions of Americans, however, these common structures present tremendous barriers to a normal way of living. If one is bound to a wheel chair, a six-inch curb can be just as great an obstacle as a ten-foot wall. Steps, a narrow doorway, or an inaccessible restroom restrict handicapped persons and limit their freedom and mobility in the community, business, or perhaps even the home.

Architects in the past have been content when the structures they designed functioned well by accommodating the "average person". Population statistics for the physically handicapped in the United States in general state that one person in ten, however, has some disability which prevents him from using buildings and facilities designed for the physically fit.

Educators and architects are now beginning to realize that the special architectural needs of the physically impaired are complex and require considerations different from those previously used.

Of particular interest is the realization that physically handicapped youngsters comprise a sizeable percentage of the national school-age population. It has been estimated that from ten to twelve percent of school-age children, or three to four million, have serious physical handicaps of one kind or another. A National Health Survey indicated that over two million children under fifteen years of age are affected by blindness, deafness, paralysis, missing or deformed limbs, or other orthopedic handicaps. Many others are epileptics, have serious speech defects as a result of cleft palate, cerebral palsy or another congenital defect, or suffer from a variety of health impairments (Patterson, 1962, p. 231).

A census conducted in the State of Tennessee during the spring of 1973

identified 82,811 children ages 5-18 as being handicapped and therefore eligible for, or in need of, supportive or corrective educational services. This census also identified 89,168 children in the same age range as possibly handicapped, but not certified by a specialist.

This total number of verified and possibly handicapped (referred) children ages 5-18 was 171,979 or 16.24 percent of the school age population of 1,057,601. Among the 171,979 identified as handicapped or referred, 52,593 or 30.5 percent were physically handicapped. For the purpose of the census, the physically handicapped were defined as the crippled and other health impaired, speech handicapped, hearing handicapped, partially seeing, blind, and multiple disabled.

In order to compare the Tennessee data with national figures, a study reported in the **National Education Finance Project** was used to determine exceptionality prevalence rates; (Johns, Alexander, Jordan, 1971, p. 69).

EXCEPTIONALITY	ESTIMATE PREVALENCE (%)
Gifted	2.00
Educable Mentally Retarded	1.30
Trainable Mentally Retarded	0.24
Auditorily Handicapped	0.10
Visually Handicapped	0.05
Speech Handicapped	3.60
Physically Handicapped	0.21
Special Learning Disorders	1.12
Emotionally Disturbed	2.00
Multiply Handicapped	0.07
Homebound/Hospital	0.22

Utilizing these national prevalence rates and applying them to the school age(5-18) population of 1,057,601, it is expected that Tennessee would have 115,354 handicapped children. Of this total, 42,624, or 36.9 percent would be expected to be classified as physically handicapped. This figure compares favorably with a recent estimate contained in the **Census Report of Tennessee's Exceptional Children** which suggests that there are 115,000 children in Tennessee that would qualify for special supportive, and/or corrective services to meet their needs and maximize their capabilities as citizens.

Children with handicapping conditions are found to some degree in all school divisions throughout the nation. Recent legislation, court cases and parental pressure make it necessary that school architects consider the total school population in school plant design. If integration of exceptional and normal children is to be a goal of the educational program, then the physical and psychological environments must be carefully planned to provide the necessary accommodations and allow these children to enjoy the total school program.

ELIMINATING ARCHITECTURAL BARRIERS IN EDUCATIONAL FACILITIES

"I'm very glad for the new emphasis on including individuals with disabilities in the regular schools. I'm very glad for the legislation which now makes it mandatory in most of our states. But I want to say something emphatically: I've never seen a problem with this dimension solved with legislation; it takes a great deal more than legislation.

There must be a readiness on the part of the school system into which these disabilities are going to be introduced. There must be a readiness on the part of the faculty of that school. There must be a readiness on the part of the able-bodied students. There must be a readiness on the part of the family of the child with the disability to let him enter into that competitive situation and not be solicitous, too overprotective, and not undo what the school has done the minute he leaves school. And there must be a readiness on the part of the young person with the physical disability. And unless that readiness exists, the best planned school with all the will that comes from the higher echelons will be a miserable failure. In working with these people, deviate as little as possible. They have the same aspirations, interests, talents, and skills as all people. Tomorrow, any one of you could be a paraplegic from an automobile accident, falling down the steps, falling in a bathtub. Would you have any less of a head or or a heart than you have today? Wouldn't it be criminal if someone should think of you in your own facilities in which you work that because of that God-given unfortunate circumstance you could no longer practice your profession? They must have the same avenues, be privileged to travel the same avenues you and I have traveled; the avenue of self-exploration, and self-identification to identify ourselves as part of, and apart from, the rest of the world. The avenue of self-expression, the avenue of self-administration, and the avenue of self-discipline. Seriously, anyone who has ever worked closely with disabled persons knows that they have not traveled these avenues, there has always been some third party there—mom, dad, a doctor, a counselor, a teacher deciding for them what they could and couldn't do and this has been part of their demise. They need to have the opportunity to pursue all avenues of endeavor and all facets of life, the need for security, the need for faith, in all of its manifestations. They must be put into situations which are challenging because they will develop only to the degree to which they are challenged. And anytime some teacher says he doesn't think you should do that, you may be taking away the best learning experience this youngster had. Let him find out for himself within the parameters of good facilities and good programming whether he can do it.

If we will break down the man-made physical barriers and open up the opportunities to these young people, they in turn will project themselves among us and break down the attitudinal barriers."

Dr. Tim Nugent, Director
Division of Rehabilitation
Educational Services
University of Illinois

11

12

OPTIONS FOR PLANNING COMPREHENSIVE SERVICES FOR THE HANDICAPPED

Many states are closing down or phasing out their large institutions in favor of group homes and foster care. Agencies such as United Cerebral Palsy, the Crippled Children's Society, Good Will, and National Easter Seals have joined forces for the development of new residential units for the severely handicapped located in the heart of ordinary neighborhoods in ordinary cities. As a result of this new influx of disabled persons into the school district and in anticipation of a new state law mandating equal education for all disabled children, the Seattle Public Schools initiated a plan to integrate all their disabled constituents into regular home schools.

Forty-eight states now have legislation mandating some kind of educational service for handicapped children. Over thirty states, Tennessee among them, have enacted comprehensive special education legislation requiring that public education assume the primary responsibility for educating all handicapped children and emphasizing individual diagnosis and evaluation—not labels or group categories.

In addition to state legislatures, the judicial system is also firmly upholding the rights of the handicapped to equal treatment, equal education, and equal opportunities.

Many school districts frequently discharge their obligation to handicapped students by either providing tuition assistance for a private education, or by transferring the student out of the state or out of the district, or by constructing a single magnet center in a remote corner of the district where all disabled students are sent for learning and therapy. Many school districts all over the country are opening new magnet centers for particular disabilities—schools for the deaf, the emotionally disturbed, the physically handicapped, the mentally retarded, the blind, the brain damaged, the cerebral palsied, and the learning disabled. Yet, there is a visible trend away from such magnet centers for the handicapped and a growing number of lawsuits are challenging the legitimacy of remanding students to such special centers. Court decisions so far are away from secluded restrictive environments exiled from the community, and toward less restrictive, mainstream facilities most like those provided normal children.

Rather than bringing special ed students to regular schools, some school districts are bringing regular students to former special ed centers. In Seattle, Washington, for example, empty school buildings which had been converted into special schools have recently added new wings for both normal students and neighborhood kids as well.

Many school districts are now building a new breed of schools aimed at integrating the disabled youngster with the students in a particular neighborhood. The Danbury School in Claremont, Calif., for example, is a new school designed for 120 neighborhood

elementary school kids plus 90 orthopedically handicapped and 6 multiply handicapped youngsters. The school was planned with 3 open plan pods, three for the regular kids on the right and two pods twice regular size on the left for the handicapped. In the beginning, the two programs stayed pretty much to themselves but pretty soon, due to some specially designed equipment for the handicapped that attracted teachers in the regular program and because the teacher planning office was specially designed for all teachers to share together, the two programs began to merge.

Rather than building new schools, some school districts are concentrating on specialized support and early intervention facilities. The Family Learning Center in Toledo, Ohio, for example, is an old elementary school building which has been converted into a resource and training center for very young deaf children and their parents and siblings. Portions of the old school building were modernized into living rooms, kitchens, bedrooms, and baths. Then, entire families with deaf children are brought into this laboratory in order that special teachers can train all the family in ways to communicate and relate to the deaf. The program has been so successful that the school district has been able to mainstream all their graduates in regular elementary schools.

Vocational and rehabilitation centers are frequently another kind of specialized support facility which has great potential for young disabled children. In fact, many school districts are already building their own vocational and prevocation training centers with special programs for the handicapped contained in these career magnet centers which draw their students from all over the district.

In New York, special state legislation allows school districts to pool their resources in order to offer special services that are not economically feasible for a single district. The result of this district cooperation is usually a separate board of education comprised of representatives of all cooperating districts. This board monitors the special facilities and programs.

There are all sorts of new things happening in special education today. Everything that is happening, however, is moving in the direction of placing the disabled person back into society. Clearly, these examples show that society and the handicapped have a lot to gain from one another. Those schools which have already pioneered new programs have produced graduates who are better citizens, who contribute to society and are no burden on the taxpayer. Maybe in the future, our disabled youngsters will be looked upon as a class of people with huge potential, persons who with the proper treatment and training will become a mainstay in the United States working force.

99

Larry Molloy
Project Director
Educational Facilities
Laboratories
New York

15

16

VOCATIONAL PROGRAMS AND FACILITIES FOR THE HANDICAPPED

We have an appreciable percent of the handicapped, including mentally handicapped, the hearing, sight and speech handicapped, and those with multiple problems, whose handicaps will not go away with time or treatment.

The handicapped have been found to reach a state of boredom, when in the educational process they've reached their academic level. Vocational subjects can open new doors for them in new fields.

Most of us who have been closely associated with handicapped children have learned the value of a handicapped member to other siblings.

Next, what are the goals in vocational education? Obviously, it is that we are preparing young people for the world of work. The preparation for the world of work means a great deal. It means learning skills; it means learning work habits; learning grooming; it means learning a lot of things. But it's all part of the preparation for the world of work which is certainly the goal of the handicapped as well as the goal for any of the rest of us.

17

The handicapped have their strengths, they have stronger urges and need more direction and more careful guidance in accomplishing this. Certainly, one of our goals when we talk about vocational education for the handicapped is preparation for independent living.

After the student has joined the regular curriculum and become just another student in the curriculum we must still recognize that he is an individual, that he has his needs, and that we must recognize these needs and give direction to him as an individual. As long as our total educational philosophy and concept is in the direction of the education of the individual the handicapped just becomes another of the individuals who is working for his education and who we are trying to assist in his concerns.

The handicapped, given the opportunity and the challenge, will do everything in the world to join the crowd. We do not need to alter the system to conform to any particular requirement of the handicapped person.

The handicapped are to join the mainstream of the curriculum. They're treated as individuals along with all learning, so we're right back to the basic concept of self-paced learning as the approach to all education. This concept of self-paced learning has brought about tremendous changes in educational facilities. In the self-paced learning concept we must provide for independent study wherein resources are available to the student.

Everyone was convinced that the student could learn best by doing when he had to face the realities of earning a living. After all, he had to be turned out of school able to do something; so in order to do it when he gets out, he was given the opportunity in hands-on experience to do it.

With the school being barrier free, the handicapped do require, I believe, one added facility to the normal school, and that I'm going to

18

call the home base. This is somewhat like a meeting room lounge where the handicapped student, who has reached the limits of his strength, can come to as a place of refuge. This may be on those occasions when he feels the pressures are too great. Around this meeting room lounge other facilities can be located, such as an independent study base for special purposes, the offices for the physical therapist, the occupational therapist, the psychologist, possibly the psychiatrist, and any others who may be treating the child, giving him that special attention that is not the responsibility of the teacher. It seems appropriate to set aside an area in the school that the handicapped student knows he can go to if he wants to. This meeting room lounge should not be down in the basement or tucked away in some obscure place. Often it is located in a convenient place near the main entrance or off the main commons of the school. This results in the formation of a natural circulation pattern, making it easy for anyone to go there.

David Ward
Ward Associates
Architects
Cleveland, Ohio

19

TENNESSEE GUIDELINES FOR MAKING EDUCATIONAL FACILITIES USABLE BY THE HANDICAPPED

In order that adequate attention be given to the problem of identifying the physically impaired, a survey was conducted of each of the 50 states and all territories in an effort to determine the best definition for the different types of handicaps or physical impairments.

The most adequate definitions were those presented in the American Standards Association, Inc., document A117.1-61. Those definitions are as follows:

1. Non-ambulatory disabilities. those individuals who for all practical purposes are confined to wheelchairs regardless of cause or manifestation.

2. Semi-ambulatory disabilities: those individuals who walk with difficulty or insecurity, or require the use of prostheses, braces or crutches (including amputees, arthritics, the cerebral palsied, and those with pulmonary and cardiac disabilities).

3. Sight disabilities: those individuals who are totally blind and those whose sight is impaired to the extent that traveling in public areas may be insecure and hazardous.

4. Hearing disabilities: those individuals who are deaf or have a hearing handicap to the extent that they might be insecure in major public areas or industrial situations because they are unable to communicate or hear warning signals.

5. Disabilities of incoordination: those individuals who have faulty coordination or palsy as a result of brain injury, spinal injury, or peripheral nerve injury.

20

South Carolina presented excellent definitions for verification of the handicapped by specialists. These definitions are as follows:

"Hearing handicapped pupils" means pupils of age four or older who are certified by a licensed specialist that their hearing deficit requires special classes or specialized education instruction suited to their needs;

"Orthopedically handicapped pupils" means pupils of legal school age who have an impairment which interferes with the normal functions of the bones, joints, or muscles to such an extent and degree as to require the school to provide special facilities and instructional programs;

"Visually handicapped pupils" means pupils of legal school age who either have no vision or whose visual limitations after correction result in educational handicaps unless special provisions are made.

A definition presented by the State of Idaho is an excellent example of a precise definition requiring the use of a specialist to determine the handicap. This definition is stated in the following manner:

"Blind," "totally blind," "visually handicapped," and "partially blind" means having central visual acuity not to exceed 20/200 in the better eye, with corrected lenses, as measured by the Snellen test, or visual acuity greater than 20/200, but with a limitation in the field of vision such that the widest diameter of the visual field subtends an angle not greater than twenty degrees (20°).

Definitions presented by the American Standards Association are adequate for the purpose of identifying types of handicaps to be considered when planning educational facilities. A specific definition, such as the one developed by the State of Idaho, is necessary to determine those students eligible for participation in the various programs and also to determine the funding to operate programs for the handicapped.

EXTERIOR

● Site

One of the methods of providing easy accessibility is through adequate site preparation. At least one primary entrance to the facility should be at grade level with little or no use for ramps. In multistory facilities, this entrance should be located on a floor serviced by an elevator.

● Ramps

Ramps should be provided for the handicapped where it is not possible to develop a primary entrance at grade level. This should include provision for the handicapped to approach buildings from parking lots on levels different from the building entrance level.

The ramp should be a minimum of 32 inches wide if it is for wheelchair traffic only. Otherwise, the ramp should be the same width as the entry way. The surface of the ramp should be constructed of a non-slip material. Should the ramp exceed 30 feet in length, a rest platform should be provided. This rest area should be a minimum of 5 feet.

A level approach to the ramp at least 6 feet long is required. At the point where the ramp enters the building, there should be a level platform to accommodate traffic, permit easy access and egress and provide a rest area for wheelchair bound persons. This platform should be a minimum of 5 feet x 5 feet or allow at least one foot clearance beyond the door swing.

Handrails, 32" high should be provided on each side of the ramp and should extend one foot beyond the top and bottom of the ramp.

The gradient of the ramp should not exceed 1:12 or 8.33%. While steeper slopes are negotiable, they require some additional provisions, such as a 30" wide "wheelchair lane," with a 2-inch high curb, 4 inches wide to allow for emergency braking by turning the wheel of the chair into the curb, much as one parks a car on a steep hill.

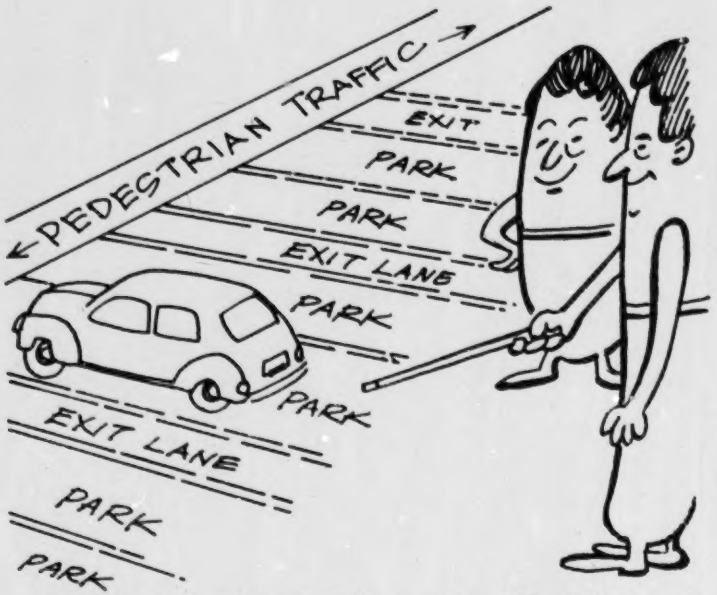
Should the ramps be exposed to the elements, a covered canopy and/or built-in snow melting device should be provided to prevent the ramp surface from becoming slippery and hazardous.

● Walks

There should be at least one primary entrance without steps providing access to the facility.

The slope or gradient of this surface should not exceed 5% or 1:20. In the event that the walk gradient is 5% for 60 feet or more, a rest platform 4 feet 6 inches long should be provided every 60 feet. The surface should be a non-slip material and be a minimum of 48 inches wide.

At those points where a walk intersects other walks, ramps or driveways, the walk should blend to a common level with surrounding surfaces. This does not include major arteries of automobile traffic.



At those points where a walk intersects other walks, ramps or driveways, the walk should blend to a common level with surrounding surfaces. This does not include major arteries of automobile traffic.

At the entrance of the building, there should be a level platform, allowing a minimum of 5 feet by 5 feet or allow at least one foot clearance beyond the door swing.

In order to achieve maximum independence, the handicapped person should be offered every opportunity to move unhindered along key routes. To assist this, gratings, man-hole covers, raised or wide joints in the walk surface, gravel or cobble stone surfaces, or materials that become slippery when wet should not be included as a part of the walk design.

24

- **Parking Lots**

Special parking privileges are normally extended to persons with temporary or permanent disabilities. These parking spaces should be located as close to the facility as possible. While the number of spaces reserved for the disabled would certainly be variable, it has been found that 5 percent is usually adequate. These reserved spaces must be identified to make them available for their intended use.

Another consideration is to make certain that the physically impaired do not have to travel behind parked cars or across lanes of traffic. While parallel parking at the curb adjacent to the destination point is most desirable, it is not always feasible.

In the event that parking bays are required, it is necessary that adequate room be provided for getting in and out of the vehicle. By designing parking bays 10 feet wide and providing an aisle 2 feet wide between every 2 spaces, the possibility of a handicapped person's having to travel through lanes of traffic or behind parked cars is reduced.

The walkway to the destination point should be at parking lot level, ramped, or properly curbed to provide easy access to neighboring areas.

- **Curbs**

At pedestrian crossings, traffic sign junctions, street corners, intersections with vehicle parking areas, and other suitable crossing points, pedestrian and vehicular surfaces should be blended to a common level surface. The curb should be painted a contrasting color with that of adjacent surface to provide easy identification.

For the blind, it is advantageous that the ramp and curb be constructed of a distinguishing surface texture such as patterned or ribbed finish.

25

INTERIOR

GENERAL CONSIDERATIONS

- **Entrances**

At least one primary entrance to the facility should be usable by those individuals with handicaps, including those who are wheelchair bound, those suffering from temporary disabilities (broken arms, legs, post-operative, etc.) and those with other physical impairments. It is important that this entrance be accessible to elevators should the building be multi-story.

- **Doors**

Doors constitute an element of extreme importance in making certain that a facility is accessible to and usable by the handicapped. While important to all with mobility problems, they are of particular concern to those in wheelchairs or on crutches.

All doors to be used by the handicapped should provide a clear minimum opening of 32 inches wide. Should the entrance be at an angle, the clear opening would need to be larger. There should be a level approach extending 5 feet in the direction of the door swing or extending at least one foot beyond the door swing.

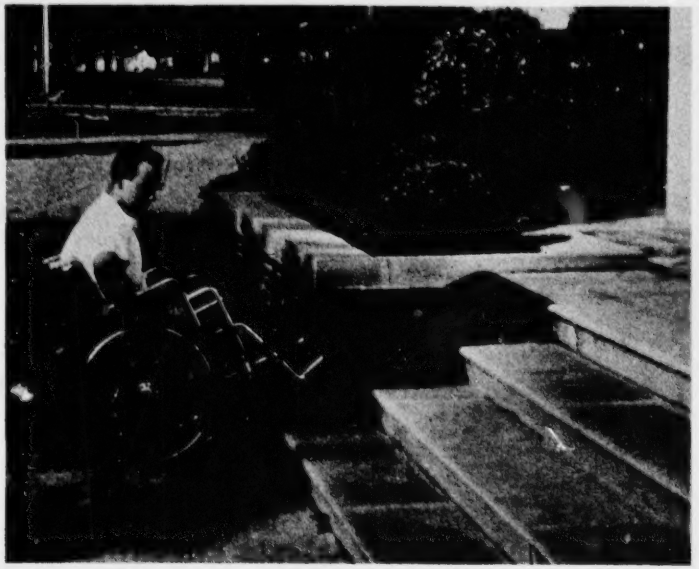
The threshold should be flush if possible, but no higher than 3/4 inches and have no vertical rise greater than 1/4 inch. This will allow easy access and egress and present few problems to the wheelchair bound.

While double-acting doors are not considered desirable, in the event they are provided, a viewing panel should be present with the lower edge of the panel 36 inches from the floor. If the door is largely glass surface, it should be marked so as to prevent accidentally walking into or through it.

Kick plates at least 16 inches high, of a material or finish hard and durable enough to withstand the abuse of crutches, wheelchairs, and braces, should be an integral part of the door design.

The force required to open a door should not exceed 8 pounds, with 5 pounds being preferred.

Should automatic door openers and closers be installed, 10-12 seconds between opening and closing action is required.

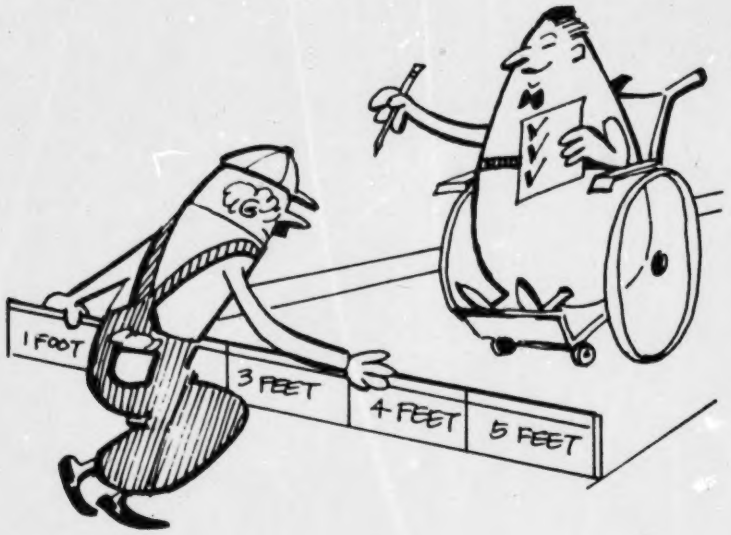


Handles should not be more than 3 feet 6 inches from the floor. Horizontal lever handles are preferred, although large serrated door knobs may also be utilized effectively. Doors opening to danger areas (e.g., boiler rooms, loading platforms, or stairwells) should be knurled to serve as a warning to those who are visually handicapped.

Revolving doors present an insurmountable obstacle to wheelchair users and users of crutches and canes. Those with visual handicaps experience extreme difficulty in negotiating this type of door also. Therefore, when revolving doors exist, an additional side-hung door should be provided.

In some facilities, 2 sets of doors are used at the entrance. When these are planned, there must be a minimum of 6 feet 6 inches between the inner and outer doors of the vestibule to insure that a wheelchair bound person cannot be trapped.

Doors should be recessed whenever possible and not open directly into the path of hall traffic.



28

● Corridors

A corridor must be a minimum of 5 feet wide in order that 2 wheelchairs be able to pass each other in a head-on direction. Non-slip flooring surfaces should be used. Some waxes or polishes have ingredients which help to make them slip resistant. This is particularly important when tile floors are used.

Floors should be on the same level, or connected by a ramp. Such design features as level changes are aesthetically quite pleasing but present severe handicaps to those with mobility problems.

Low hanging or projecting fixtures such as door closers, fire extinguishers, ceiling lights, exit signs, water fountains, and lockers present hazards to all, but particularly the visually handicapped and should be avoided.

● Stairs

Local construction codes should be consulted regarding the tread depth - riser height ration, when designing stairs. Risers should not exceed 7 inches in height and should have no projecting nosings, as these present hazards to those with mobility difficulties.

A minimum of 30 footcandles of illumination should be provided. Landings mid-way between floor levels are helpful for those requiring a rest stop during ascent or descent.

Handrails should be 32 inches above the surface and should continue uninterrupted for the full length of the stairs. The rail should also extend 12 inches beyond the top and bottom of the stairs, but this extension should not become a hazard in itself. The diameter of the handrail should be 1-1/2 - 2 inches and be mounted at least 1 - 1/2 inches from the wall surface. Recessed railings are not desirable and should be avoided. Handrails

29

should be provided on both sides of the stairs whenever possible, so as to be accessible to all users.

Studs or markings on the rails inner surface assist the blind in becoming aware of the presence of landings on the end of the stairs. These markings should be designed so that they do not become hazards themselves.

● Elevators

An elevator as an integral feature of a multi-story facility is a reasonable design assumption, quite separate from the specific needs of the handicapped. For the handicapped, however, an elevator is an essential requirement. The level normally used as an entrance into the building should be served by the elevator, as should all other levels that could reasibly be used by the typical building occupant.

Elevators should operate automatically and stop precisely at floor level. Elevator doors that open and close automatically must be equipped with a pressure-sensitive safety edge or should have a photo-electric cell mechanism to prevent the doors closing when the doors opening is in any way obstructed.

On opening, the doors should remain open for 10-12 seconds. The closing times should be 3 - 3-1/2 seconds.

The interior cab size should be a minimum of 61 inches x 66 inches. This space will allow a wheelchair to turn around inside. At the entrance to the elevator, a 5-feet by 5-feet level, unobstructed area should be provided.

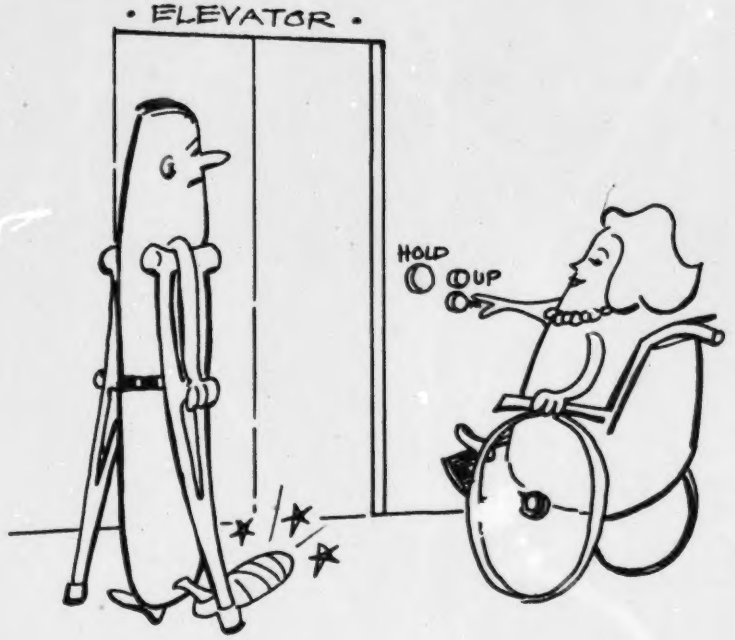
Horizontal rails approximately 32 inches above the floor are helpful to those using the elevator. The interior surfaces should be constructed of material resistant to scratching and marring by wheelchairs, crutches, braces, and prosthetic devices.

30

The call buttons in the elevator lobbies should be centered at approximately 40 inches above the finished floor.

The operating panel should be centered 40 inches from the floor and utilize buttons that are illuminated and project from the panel board. Additionally, these buttons should be marked with raised or engraved identification adjacent to the button. A PUSH-TO-STOP emergency button raised from the panel should be included. No control button should be higher than 48 inches.

Heat sensitive control buttons should not be used, as all handicapped persons cannot utilize them.



31

● Drinking Fountains

A drinking fountain should be located on each floor in a recessed area no less than 30 inches wide to provide easy access and yet not be a hazard.

The upper edge of the fountain should not be more than 34 inches from the floor. The controls and spouts should be located at the front of the fountain and be both hand and foot operated. The drinking spout should point parallel to the front edge of the fountain.

In the event that special fountain arrangements cannot be provided, a paper cup dispenser should be made available. In such a case, adequate trash disposal must be provided.

● Electrical and Mechanical

Controls for lights, fire alarms and similar devices should be accessible to, and usable by, the handicapped. These controls and switches should be 36-40 inches above the floor.

In areas utilized by the handicapped, electrical outlets should be no less than 18 inches above the floor.

There should be no more than 2 switches per plate. Each of these should be simple and positive action. A push-pad clipped over the switch permits easy operation for forearm or elbow. A large push button is also convenient for those with finger or hand disabilities.

● Identification

Raised or notched letters or numbers should be used to identify rooms. The identification plaque should be 54-60 inches from the floor and located on the wall adjacent to the handle-side of the door.

Panic hardware bars should be marked with embossed tape, in braille, to indicate the place to which the door leads.

● Warning Signals

Both visual (blinking lights) and audible (horns, bells, sirens, etc.) signals should be provided throughout the facility. Often this signal system is the same as used to indicate class and activity changes; thus, this system will serve a dual purpose if signal devices are provided in each learning space as well as in the corridors.

● Telephones

An adequate number of telephones should be provided. The instrument should be wall mounted with no legs or enclosure to prevent access. Underside clearance between the

32

33

bottom of the instrument or shelf and the floor should be at least 30 inches. The dial should be push button if possible and no more than 39 inches from the floor. The coin slot should be no more than 36 inches from the floor. Whenever possible, an amplifier or volume control on these phones should be provided for the hard-of-hearing.

A phone mounted to these specifications also serves small children quite well.

- Sanitary Facilities

It is essential that an adequate number of sanitary facilities be made available to and usable by the physically handicapped. A restroom for each sex should be provided to include all of the following modifications and equipment with the exception of the urinal which logically applies to males only.

There should be one toilet stall that is 36 inches wide and a minimum of 60 inches deep. The door providing access to this stall should be cut-swinging and have a minimum clear opening of 32 inches. The toilet seat should be between 19-20 inches above the floor to allow for easy transfer by the chair bound. Horizontal hand rails should be mounted 33 inches from the floor and fastened securely at both ends and in the center. This rail should be 1 1/2 inches in diameter and mounted so as to provide a 1 1/2 inch clearance between the rail and the wall. Additionally, a vertical rail 18 inches long and of the same dimensions should be mounted with the lower end 33 inches from the floor. This will provide stability for those with ambulatory handicaps.

- **Urinals**

Wall-mounted urinals are preferred over floor-mounted or stall-type urinals because of the clear space between the lower rim of the fixture and the floor. The front rim of the bowl should be 19 inches from the floor, as this is the mean height of a wheelchair seat from the floor and would allow easy use of the facility. A level-type manual flush system with controls no more than 40 inches from the floor should be utilized.

- **Sinks**

The lavatory basin should be wall-mounted or contained in a counter top so as to provide a minimum of 30 inches of clearance between the floor and the sink edge or counter apron.

Care should be taken that drain pipes and hot water pipes under the fixture are insulated to protect the user from possible burns. It should be noted that many persons with mobility

34

35

difficulties have sensory impairments also, requiring this type of protection.

Self-closing faucets should not be used. Rather, wrist-blade or lever handles should be installed so that a minimum of 1 1/2 inches of clearance is provided between the handles' turning radius and the wall.

As an aid to those with sight deficiencies, the placement of the hot water faucet on the left and the cold on the right should be a standard procedure.

Mirrors and shelves should be provided at a height as low as possible. Another method would be to use a mirror that is mounted in a tilted position, thus providing a full view. If this is not used, then the mirror should be mounted so that the bottom edge of the fixture is no more than 40 inches from the floor.

A full-length mirror mounted with the bottom edge 24 inches from the floor is desirable and would be easily utilized by all persons.

Towel racks, towel dispensers, toilet paper dispensers, soap containers and any additional hardware should be mounted to provide a minimum of 40 inches clearance from the floor.

36

SPECIAL AREAS

● Auditorium

In an auditorium, it is important that the physically impaired be accommodated as well as others using the facility.

The space provided for each chair should be 4 feet 9 inches by 3 feet. The number of spaces available will vary, but in general one percent of the capacity should be reserved for wheelchair-bound persons so that it is not necessary for them to transfer from the wheelchair to a regular seat. Space to accommodate stacking chairs should be provided in order that an able-bodied person accompanying the chair-bound person be able to sit with that person. Caution must be exercised so as not to obstruct the view of those seated behind this reserved area.

Additional consideration must be given to exit routes so that the exiting of those with mobility problems will not create any obstruction to a speedy evacuation process. Both the front doorways and the exits at the sides of the stage should be designed to accommodate the physically impaired. This will necessitate ramps, handrailings, and other considerations for such an entrance or exit.

Provisions should be made so earphones can be used as an aid for those with hearing impairments. Either an induction coil loop, or wireless AM or FM transmitters when combined with head set receivers serves this purpose quite adequately.

It is feasible that the handicapped will be participants in, as well as observers of, activities in the auditorium. Thus, consideration should be given to providing access to the stage and dressing room areas.

37

● Cafeterias/Dining Halls

A person with a physical impairment should be able to obtain the same food and services as other users of a facility without the necessity of segregated facilities to accommodate them or without traveling through the kitchen area via the service ramp to reach the dining area.

Traditional serving lines will accommodate the disabled quite adequately if the control railing has a clear space of 34 inches between the railing and the serving tray slide. The tray slide can still be the regular height of 34 inches.

The beverage and water dispensers should house spigots or nozzles that will permit glass to rest on the counter while being filled. Aisle space between tables should be a minimum of 36 inches clear space to allow for free traffic circulation. Dining tables should have a 30-inch clearance between the underside of the eating surface or table apron and the floor.

● Classroom

Provision for making a regular classroom accessible to and usable by the physically impaired mandates an optimal thermal, visual, and acoustic environment. A minimum of 150 footcandles of illumination should be required. The problem of acoustic control can be aided by the use of carpet. This will not hinder the mobility of those with physical impairments.

Both visual (blinking lights) and audible (horns, sirens or bells) signals should be installed in classrooms. Not only will these serve as indicators of class activity changes, they may also be used as an integral part of an emergency warning system.

A wireless radio or an induction coil loop should be provided to assist the hard-of-hearing. The equipment may also serve other functions such as individual study and language laboratory assistance.

A small diagnostic testing room of approximately 400 square feet should be available in any facility. This space may serve as an instructional area and conference room when not being used for testing. It should be environmentally treated to provide an optimal learning and testing climate. This mandates that considerable attention be devoted to the thermal, visual (including color), acoustical and aesthetic environment.

● Gymnasiums and Physical Education

Adequate space should be provided in the gymnasium to accommodate modified or adapted physical education activities. Adaptation for the physically impaired generally involves a modification of activity through degree or manner of participation as opposed to extensive special equipment modifications. In those instances requiring modified equipment, the fixtures, sockets, and supports normally installed in a physical education facility will usually accommodate any special equipment.

● Swimming Pool

A swimming pool is valuable in a physical education program, but it is of particular value to a handicapped program.

A few facility modifications are necessary to accommodate the physically impaired. The pool deck surface should be of a non-slip material. This provides protection not only for the disabled but also for other users. A flush deck pool should be installed.

Access into the pool should be by means of a sloping ramp or steps equipped with hand rails. Either of these adaptations is acceptable. Some attention should be devoted to the surface drainage system of the pool to insure the gutter normally used for debris control does not become a hazard.

● Sanitary Facilities (for each sex)

A minimum of one toilet stall, lavatory and accessory cluster that meets requirements previously established for a restroom permits the disabled to use the facility.

Each shower room should contain two specially designed shower cubicles. One should have a seat on the left cubicle wall, the other on the right. In both instances, the seat should be opposite the shower head.

The shower seat height should be equal to the height of the wheelchair seat when the chair is outside of the shower cubicle. The seat should be 14 inches wide, extend the full 3 feet length of the cubicle wall and turn the corner for at least 8 inches on the adjacent perpendicular wall.

The seat should be designed to permit it to be folded back against the wall when not in use.

A horizontal rail or grab bar should encircle the shower cubicle, be 1 1/2 inches in diameter and have 1 1/2 inches clearance between the rail and the wall. The rail should be mounted 33 inches above the shower floor and be securely fastened to the wall.

The cubicle should be a minimum of 3 feet by 3 feet, well drained and have a non-slip floor. An entrance area to the cubicle at least 4 feet x 3 feet should be provided as a private disrobing area and also serve as a drying area when leaving the shower stall.

The splash curb at the threshold of the shower cubicle should not exceed 2 inches in height. This will allow the foot rests of the wheelchair to pass over this curb and permit an easy transfer to the shower seat.

40

41

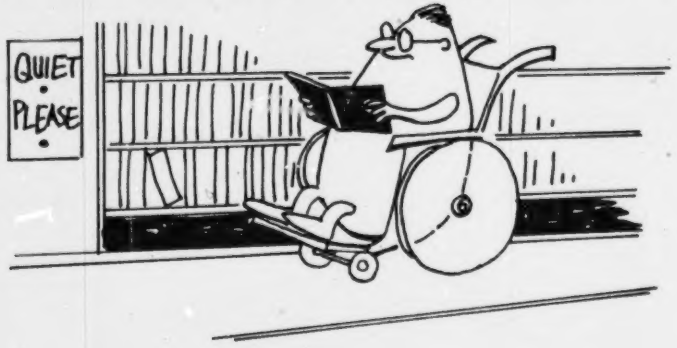
Wrist blade or lever handles for water controls should be used. The temperatures of the water should be regulated so as to ensure that the handicapped user will not be burned. There are 2 methods of accomplishing this. One would be to regulate the temperature of the water to approximately 110 - 112 degrees at the supply point, giving a water temperature at the delivery point of about 105 degrees. A second method would be to install thermostatically controlled anti-scald valves on the shower. Either of these methods is acceptable.

The soap tray and towel bar should be mounted no higher than 40 inches from the shower floor.

● Laboratories

At least one student laboratory station should be provided to accommodate the physically impaired. This would necessitate that a 30-inch clearance exist between the bottom of the work surface or apron and the floor. This space must also be 18 inches deep and a minimum of 30 inches wide. Hot water pipes in this space should be insulated.

Faucets and utility outlets at these stations should be side-mounted rather than rear-mounted and be equipped with wrist-blade or lever handles. The aisle in this area should be a



42

minimum of 36 inches wide and clear of obstructions.

● Libraries

At least one percent of the study carrels and library tables should be accessible to the handicapped. This requires a minimum of 30 inches clear space between the underside of the work surface or table apron and the floor.

As it is not economically feasible to design the book stack area to permit total mobility and use by the severely physically disabled, some assistance should be available to help these persons secure library materials. The bookshelves commonly used by the student body must not be higher than 6 feet or lower than 9 inches above floor level. The preferred levels are 5 feet 9 inches high and no lower than 1 foot 3 inches. Providing mobility in this area will, however, permit much of the material on the shelves to be examined without assistance. Thus, the aisle space between stacks should be a minimum of 48 inches.

Card catalogues, dictionary, stands and other reference volumes should be on bases 30 inches from the floor.

Provision should be made for soundproof booths or study carrels where both the blind and hard-of-hearing may use tape recorders, carousel projectors, and other audio-visual equipment.

● Transportation

School buses have been found to be satisfactory for transporting some ambulatory or semi-ambulatory persons. While this is not the optimal arrangement, those provisions are adequate.

For the more severely handicapped, appropriately engineered vans and compact buses with open interiors serve as an adequate and efficient means of transportation. These

43

vans should be equipped with side and rear doors providing an unobstructed entrance of at least 48 inches. Wheelchair-bound persons should be transported in their chairs. Seating in the van should be arranged to allow the chairs to face the front of the van.

To assist with entry, the van should be equipped with a hydraulic lift having a platform a minimum of 33 inches by 51 inches, a lift capacity of 700 pounds and having a tapered front edge to permit easy mounting of the platform by wheelchair persons.

● **Fire Protection and Safety**

One of the problems involved in planning facilities for the handicapped is that of fire protection. Obviously, providing adequate access routes will also assist in speedy egress. A major difficulty arises, however, when the facility is multi-story. Elevators, during a fire, are neither a legal nor a safe means of evacuation. Thus, the handicapped person, particularly the wheelchair users, will be unable to leave the building without some assistance.

A solution to this problem would be to identify each building accessible to the handicapped and provide an area of refuge accessible to them during a crisis. This area of refuge should be located on the side of a firewall away from a potential fire source. This space should be located out of the main traffic circulation patterns and should be equipped with a separate alarm system to indicate that a handicapped person is present in this area of refuge.

Fire extinguishers and alarm boxes should be located throughout the facility at a height no greater than 48 inches. These extinguishers and alarm boxes should be recessed so as to not become an obstacle to the blind.

Automatic fire doors, when adjusted to the pressure required to make them usable by the handicapped, may not remain effectively closed in a strong draft created during a fire. Fire doors to prevent this happening may be equipped with electro-magnetic smoke-and-heat-sensitive door holders which hold the fire door open during normal use but close during a fire.

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44

45

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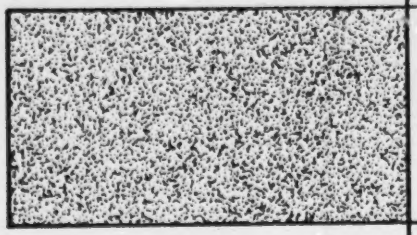

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